Wetting Transitions of Methanol on the n-Alkanes

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Results are presented of the wetting properties of methanol (CH_3OH) at the liquid-vapor interface of different n-alkanes (C_nH_{2n-2}, denoted as C_n) ranging from hexane (C_6) to undecane (C_{11}) as well as alkane mixtures with non-integer effective carbon numbers ranging from n = 8 to 10. Measurement of the contact angle shows that, as the bulk critical point is approached, wetting transitions occur for long alkanes (n > 8), whereas drying is found for short alkanes (n < 8). Measurements of the wetting layer thickness and precise contact angle measurements close to the wetting temperature, T_w, reveal a change in the order of the transition. First-order (discontinuous) wetting occurs for T_w far from the bulk critical point T_c. Critical (continuous) wetting is observed for T_w close to T_c. The observed critical wetting transition has all the features of the long-sought short-range critical wetting transition. The results for the critical wetting transition are discussed in detail.